(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 496 046 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **91119225.0**

(51) Int. Cl.5: **B65G 47/08**, B65G 17/00

(22) Date of filing: **12.11.91**

(30) Priority: **21.01.91 IT 12191**

(43) Date of publication of application:
29.07.92 Bulletin 92/31

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE

(71) Applicant: **GECA S.R.L.**
Via Pacini, 50
I-20131 Milano(IT)

(72) Inventor: **Colombo, Angelo**
Via Valvarrone, 7/c
I-22050 Dervio (Como)(IT)

(74) Representative: **Dr. Ing. A. Racheli & C.**
Viale San Michele del Carso, 4
I-20144 Milano(IT)

(54) Apparatus for conveying and grouping products.

(57) A description is given of an apparatus for conveying, collecting and grouping foodstuffs or other products, or packs (P) coming from a conveyor (3) at the exit from a production line, and directed for example towards cartoning, said apparatus comprising an endless conveyor (T), on which idle trolleys (7) run, having on their outside product collection pockets (6) and on their inside respective metallic plates (8), preferably of copper, at least one linear electric motor (9) being located inside the conveyor, which generates an electromagnetic thrust flux which tends to accelerate the trolleys (7) in the zone where such motor (9) is provided.

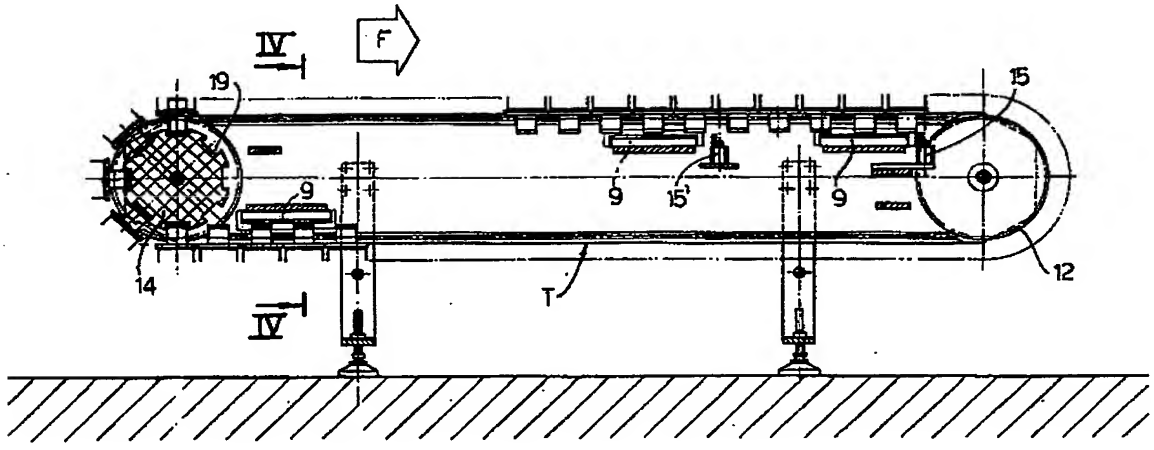


FIG. 3

EP 0 496 046 A1

The obj ct of the present invention is an apparatus for conveying and orderly grouping products or packs coming one after th other from one or more supply conveyors, particularly packaging lines in the foodstuffs sector or in other packing sectors.

Apparatuses of the above type are already known and are mainly utilized for transferring foodstuffs or other products, on leaving a wrapping machine, to a subsequent packing or cartoning station where such products are taken in groups and put into suitable boxes.

These apparatuses, as far as possible, must even out the different feed rate or the discontinuities of the incoming products. For this purpose, apparatuses have been planned in which the products are collected individually in independent seats or pockets, each carried by a trolley which is idle mounted on an endless conveyor. Such trolleys are operated only when the corresponding pockets have been filled with the product.

The operating means for the trolleys, which are normally idle, consist of purely mechanical means, such as, for example, friction shoes, belts, bands, and suchlike. This leads to the apparatus having a very complex structure, but, more especially, these means are subject to wear and therefore breaking as time goes on.

This is a serious problem, if it is considered that the said apparatuses are, in most cases, included in foodstuff production lines, such as lines for producing icecream or oven-baked products, and for this reason any downtime of the apparatus, in order to be able to carry out the replacement of a damaged piece, involves considerable loss of the product, which continues to be fed in by the lines upstream.

The aim of the invention is to eliminate the above drawbacks by providing an apparatus for conveying, collecting and grouping products or packs, which is structurally simple and in which the risks of failure due to wear have been reduced to a minimum, if not entirely removed, by the complete elimination of mechanical operating means for the independent trolleys.

The aim is achieved, according to the invention, by means of the characteristics listed in the appended claims.

In particular, the idle trolleys, which run inside an endless conveyor, have an inner plate made of metal, particularly copper, suitable for receiving an electromagnetic thrust flux at certain points of their run, generated by special linear electric motors.

The endless conveyor consists of two double lateral chains, whos outer rollers receive th ir motion by means of normal toothed sprocket wh els and are guided by special chain guides, while the inner rollers guide the trolleys which, even though they are idle, advance along the conveyor path by the effect of their own weight.

The linear motors which generate the electromagnetic thrust flux for the trolleys are positioned at the most convenient points inside the endless conveyor, and particularly in the zone where the trolleys must collect in order to provide for an uninterrupted presence of pockets at the point where the products are fed in, and at least in the zone where such products collect for subsequent cartoning or packaging.

Further characteristics of the invention will be more clearly understood from the following detailed description which refers to an exemplary and non-restrictive embodiment, illustrated in the appended drawings, in which:

- Figure 1 is a perspective diagrammatic view of an apparatus for conveying, collecting and grouping products according to the invention, with only one feeding line;
- Figure 2 is a top plan view of such apparatus;
- Figure 3 is a longitudinal diagrammatic sectional view, taken along the line III-III in figure 2;
- Figure 4 is a transverse sectional view, taken along the line IV-IV in figure 3;
- Figure 5 is a partial diagrammatic top plan view of an apparatus according to the invention, with two feeding lines for the products and with regular functioning;
- Figure 6 is a diagrammatic sectional view, taken along the line VI-VI in figure 5;
- Figure 7 is a view like the one in figure 5, with irregular feeding of the products on the two lines;
- Figure 8 is a diagrammatic sectional view taken along the line VIII-VIII in figure 7.

In the figures 1 to 4, reference number 3 shows a feeder belt, coming for example from a wrapping machine, by which the products P, which may be at irregular intervals, are transferred to two variable speed belts 2 and 1, along which photoelectric cells 4 are located, which detect the presence of the products P and the distance between them, which may be varied with the sudden variation of the speed of the belts 1 and 2, which are controlled by an electronic numerical control system. In this way a minimum distance is always guaranteed between the products, which is indispensable for their subsequent introduction into the individual collection pockets 6, to be described more fully later, said pockets moving forward in the direction of arrow F (figure 3), along an endless

conveyor T. In the final section of belt 1 two side belts 5 are provided, which, when particularly high speeds are involved, can move slightly in the direction of the forward movement of th collection pockets 6, acting as a guide for the product P and therefore further facilitating its introduction.

The collection pockets 6 are fixed to respective idle trolleys 7, made of antifriction material.

All the trolleys 7, whose number can vary according to the feeding speeds required, the type of grouping desired etc. run on endless conveyor T, which consists of two double chains 10, in which outer rollers 17 are guided by chain guides 11 also made of antifriction material, and receive their motion by means of normal toothed sprocket wheels 12 positioned at one end of the path of the endless conveyor (figure 3), said wheels being driven by a motor 13 (figure 2); inner rollers 18 guide the trolleys 7, which, although they are idle, move forward along the endless conveyor path by the effect of their own weight.

At the end of the endless conveyor opposite to the one where the motorized sprocket wheels 12 are positioned, a splined wheel 14 is foreseen, having a plurality of equally spaced seats 19 on its periphery, whose task is that of feeding the trolleys 7 and the relative pockets 6 in a constant manner in the upper loading zone, at the exit from the belt 1.

Obviously the grooved or splined wheel 14 is operated independently by the sprocket wheels 12 at variable speed, under control of photocells 4 for detecting the product P, in such a way as to enable it to adapt to the arrival speeds of the same, given that these speeds can vary; in the case of a failure in feeding the product, the wheel 14 will stop suddenly to avoid pockets 6 leaving the loading zone without product.

Likewise it must be guaranteed that a trolley 7 must be housed in each seat 19 of the splined wheel 14, so a to avoid the product P being transferred from the belt 1 to the conveyor T without a corresponding collection pocket 6 being present. For this purpose, in correspondence with the lower inner part of the conveyor T, immediately before th splined wheel 14, a linear motor 9 is located whose electromagnetic thrust flux acts on the trolleys 7 with empty pockets 6, to ensure a thrust at the entrance of the splined wheel 14. This is obtained by providing on the lower part of each trolley 7 a plate 8 made of metal, particularly copper (see figure 4 in particular), which constitutes in particular the secondary to the linear motor (primary) by which the electromagnetic flux is closed.

Th electric linear motors used in the apparatus according to the invention are to be considered as already known in themselves and therefore no further description of them will be given. The advantage of using such linear motors lies in the fact that between them, or better the inductors or primary motors, and the plates 8 provided inside the trolleys 7 a free space is left, and therefore ther is no physical contact between such elements, and so any possibility of wear on the latter is eliminated.

Once the product is loaded into a corresponding pocket 6 the respective trolley 7 is liberated by further rotation of the splined wheel 14 and is left to be transported freely on the upper run of the chain conveyor T. In the final zone of the conveyor T a lower stop or lock 15 halts the trolleys 7 on arrival, which collect and allow an upper switch 16 to move a certain number of products (five in the example shown in the appended figures), in a zone where they can be subsequently collected by known devices, such as collector arms with suckers, hands, robots, unloading hoppers and the like, for final packaging in corrugated cardboard boxes and the like. In addition to the end timing stop 15 a second timing stop 15' is foreseen to determine the number of products to be grouped together before cartoning.

As shown in figures 1 and 3, a linear motor 9 can be foreseen also in a switching and collection zone to keep the trolleys being driven forward and subsequently accelerate them for emptying, when the stop 15 moves down, after the group of products P has been expelled from the pockets 6.

A further linear motor 9 may also be provided upstream of stop 15', as shown with a broken line in figure 3, to accelerate the moving forward of the products towards the collection zone, as soon as the stop 15' moves down. Obviously the number and the position of the linear motors 9 can differ according to particular needs.

It is also clear that the size of the linear motors 9 will also be planned on the basis of particular requirements.

An embodiment according to figures 5 to 8 will be now briefly described, using the same reference numbers as those already used for the figures 1 to 4 to indicate the same or similar parts. It will be noted that the apparatus has not been shown in its whole, since it is substantially identical to the one already described and from which it differs only in that it provides, instead of one, more feeding belts 3 for the products P, with respective variable speed bands 2 and 1 and photocells 4 to detect the presence of the products P and the distance between them.

In the figures an embodiment with two feeding lines has been shown, but obviously more lines can be foreseen.

The collection pockets 6 are positioned in the respective filling zones by a toothed belt 20 to

which they are fed in phase by the splined wheel 14, consisting in this case of two star disks, between which an end portion of the belt 20 is positioned. The toothed belt 20 is operated by a motor M that is different from the operating motor of the star wheel 14.

If the products are fed regularly (figures 5 and 6), the toothed belt 20, regularly fed by the wheel 14, presents two pockets 6 in the loading position to collect the products P, that, after loading, are taken for a certain length by the belt 20 and then left on the chains 10 of the conveyor T, where they move forward by the effect of their own weight (figure 6).

If the products P are fed irregularly, the wheel 14 interrupts the feeding to the toothed belt 20 of the pocket aimed at the line without product (the one on the right in the example in figure 7), but keeps on feeding the pockets aimed at the line where the products P are regularly loaded (the one on the left in figure 7).

Claims

1. An apparatus for conveying, collecting and grouping products or packs (P), coming from at least one conveyor (3) at the exit from a production line, which are directed towards cartoning for example, comprising an endless conveyor (T), on which a number of idle trolleys (7) are foreseen provided with respective collection pockets (6), into which the products (P) are individually received, to be subsequently conveyed, collected and grouped, characterized in that inside the said conveyor (T) at least one means (9) is provided which generates an electromagnetic thrust flux in the direction of the forward movement of the conveyor (T), said flux being collected by metal plates (8) foreseen inside the trolleys (7), in such a way that the latter are accelerated in the zone of the means (9), without any physical contact being exercised on them.

2. An apparatus according to claim 1, characterized in that the at least one means (9) is a linear electric motor.

3. An apparatus according to claim 2, characterized in that a linear motor (9) is foreseen immediately before the product (P) loading zone, to guarantee always the presence of pockets (6) in such zone.

4. An apparatus according to claim 2 or 3, characterized in that a linear motor (9) is foreseen in the collection and grouping zone for the trolleys with pockets (6) filled with products (P), in order to facilitate the evacuation of the trolleys after the products have been expelled.

5. An apparatus according to claim 1, characterized in that the said plates (8) are of copper.

6. An apparatus according to any one of the previous claims, characterized in that the said endless conveyor (T) consists of two double lateral chains (10), in which the external rollers (17) are guided by special chain guides (11) and receive their motion by means of toothed sprocket wheels (12) foreseen at one end of the endless conveyor, while the inner rollers (18) guide the trolleys which, although they are idle, move forward along the conveyor path by the effect of their own weight, an independently operated splined wheel (14) being foreseen at the end of the conveyor (T) opposite to the one where the sprocket wheels (12) are foreseen, provided with seats (19) for collecting the trolleys (7).

7. An apparatus according to any one of the previous claims, characterized in that between the apparatus itself and the said at least one feeding conveyor (3) of the product (P) two variable speed belts (2, 1) are positioned, along which photoelectric cells (4) are located for detecting the distance between the products, which can be varied by varying the speed of the belts themselves.

8. An apparatus according to claim 7, characterized in that on the final length of the said conveyor belt (1) two lateral belts (5) are foreseen which can move slightly in the advancing direction of the collection pockets (6) in order to facilitate the introduction of the products (P) into the pockets, with particularly high speed.

9. An apparatus according to claim 7, characterized in that the rotational speed of the said splined wheel (14) varies according to the speed at which the product is fed.

10. An apparatus according to any one of the previous claims, characterized in that it is provided with more than one feeding line (3) and with a toothed belt (20) which is fed in phase by the splined wheel (14), in such a way that a pocket (6) is set in correspondence with each line (3) regularly feeding a product (P).

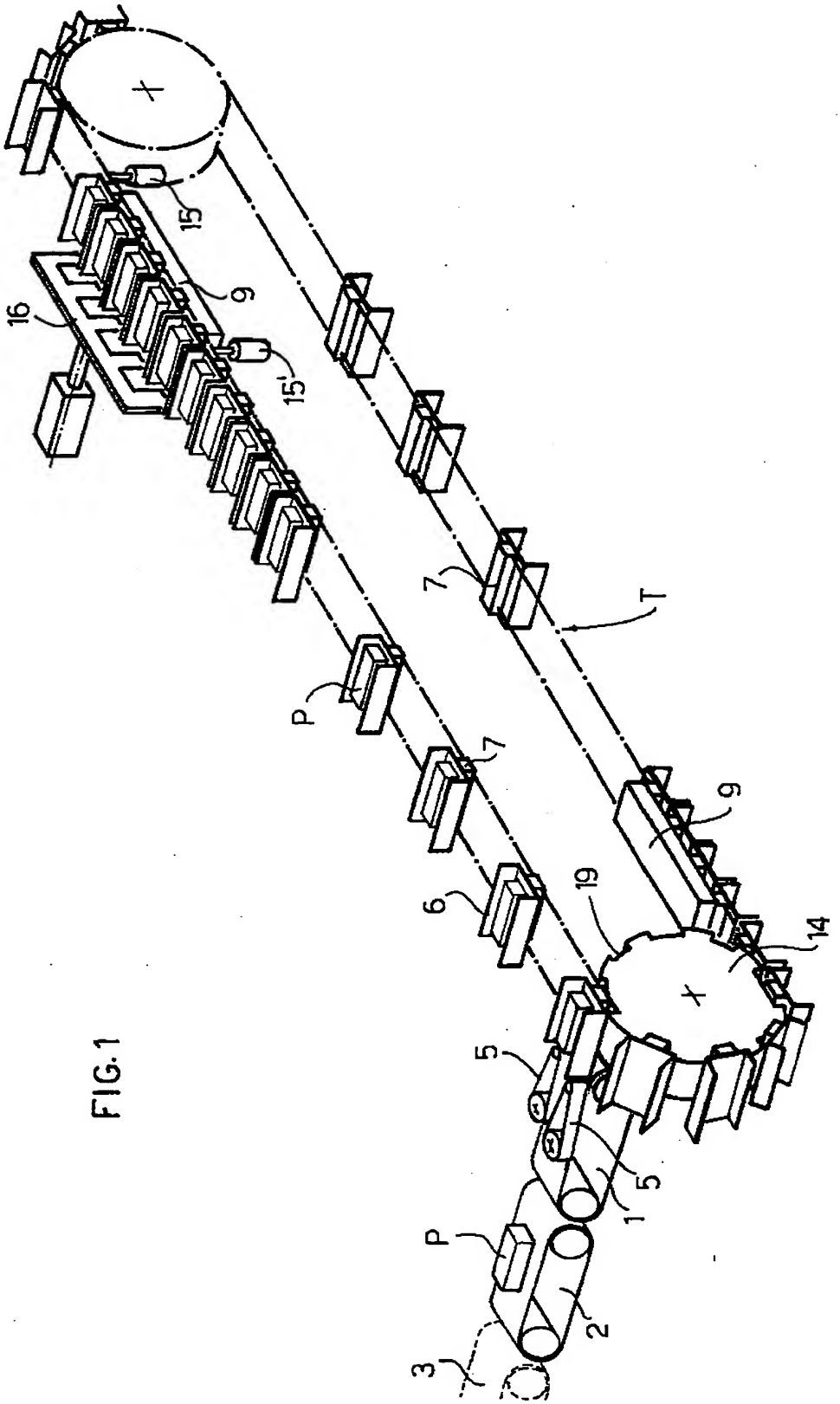


FIG.1

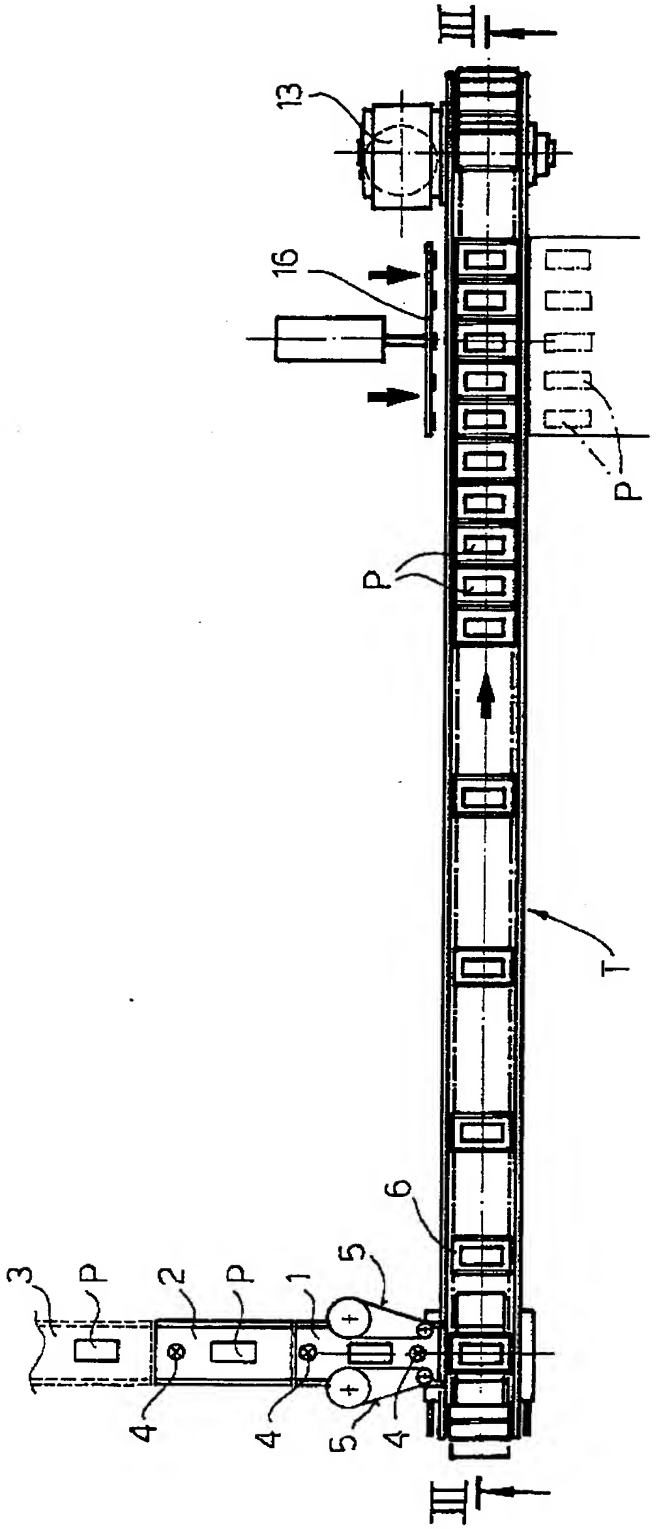


FIG. 2

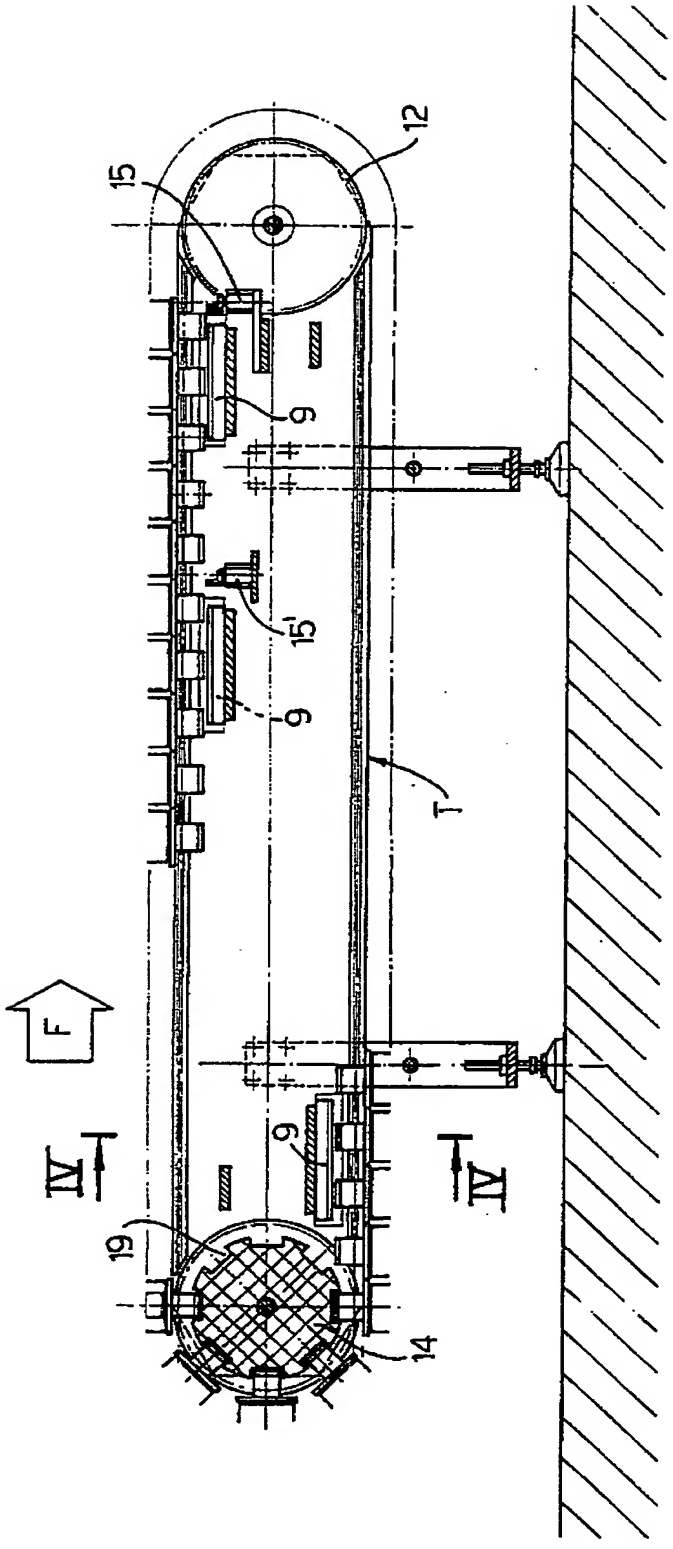


FIG. 3

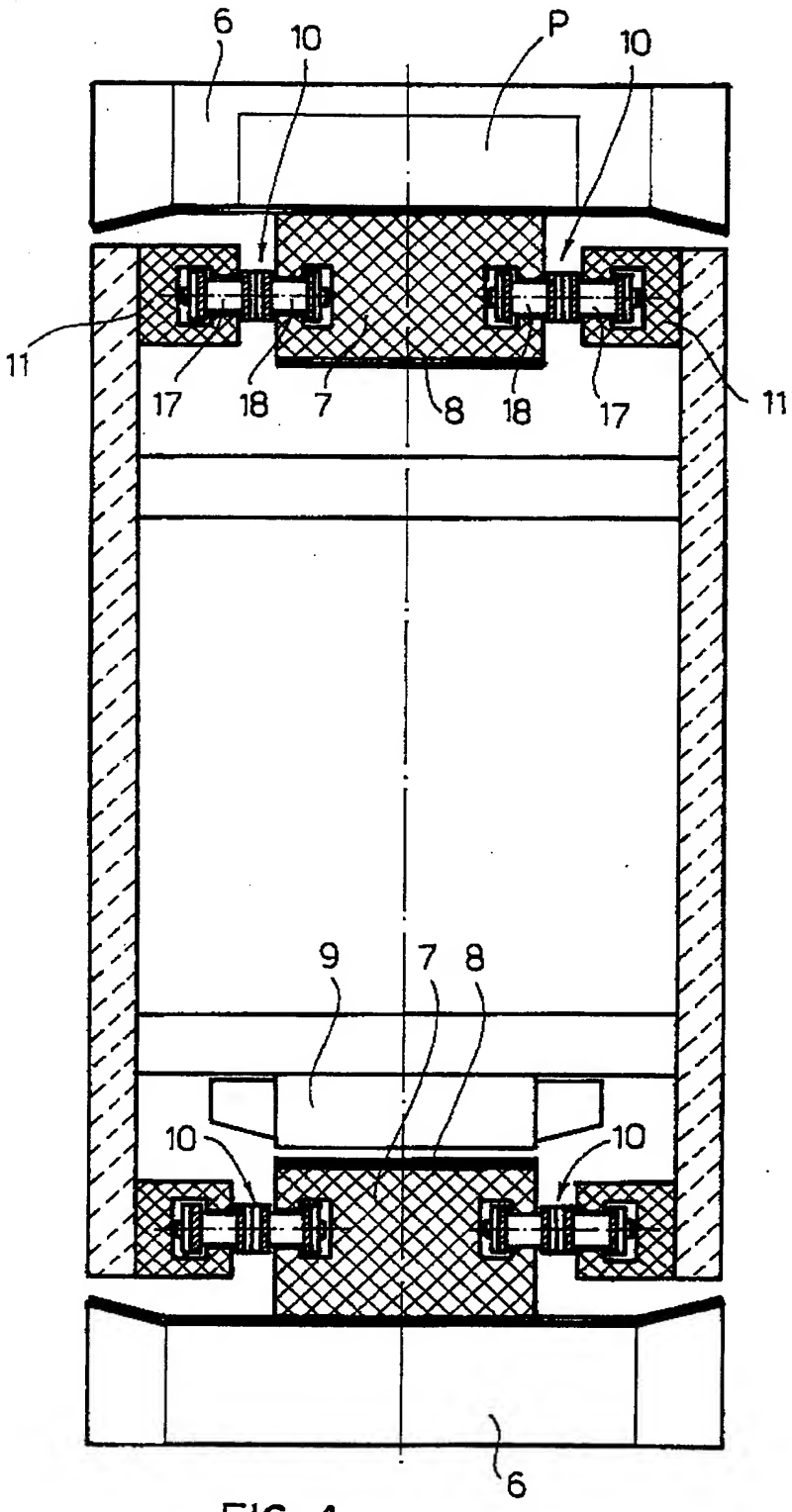


FIG. 4

FIG. 5

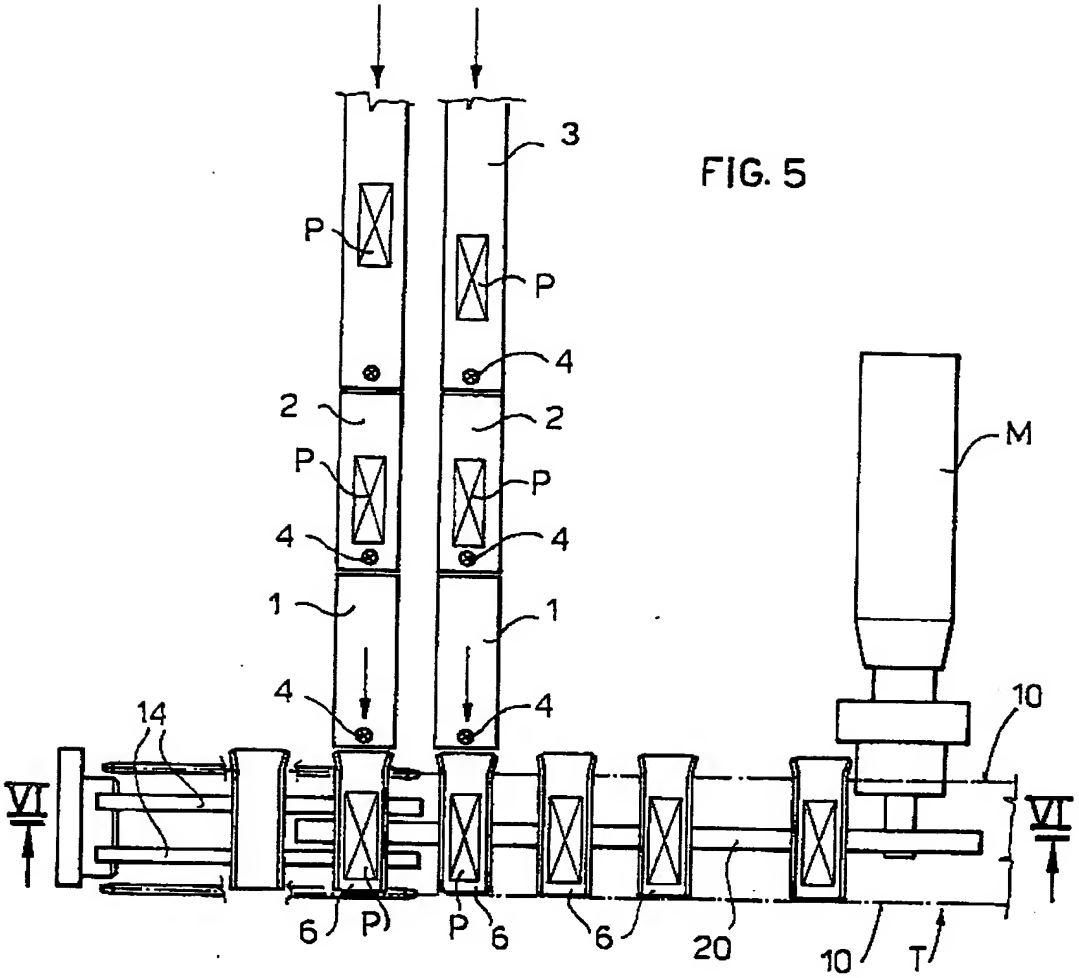


FIG. 6

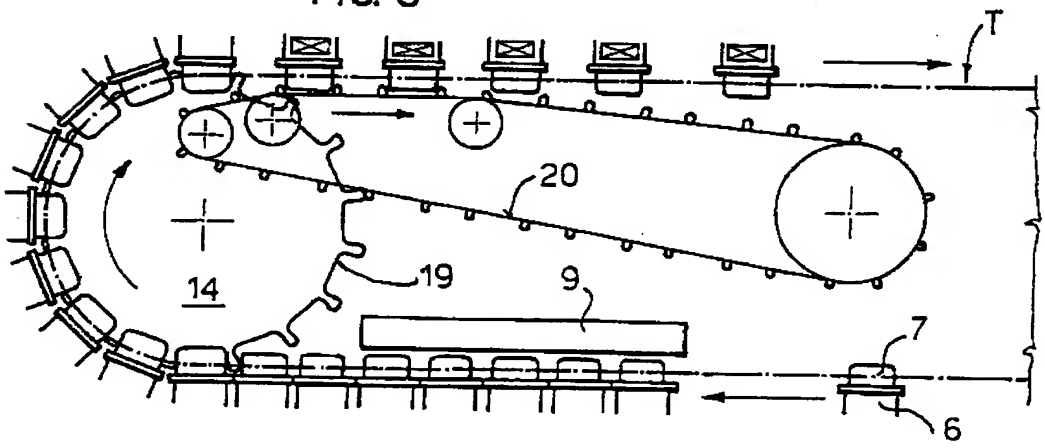


FIG. 7

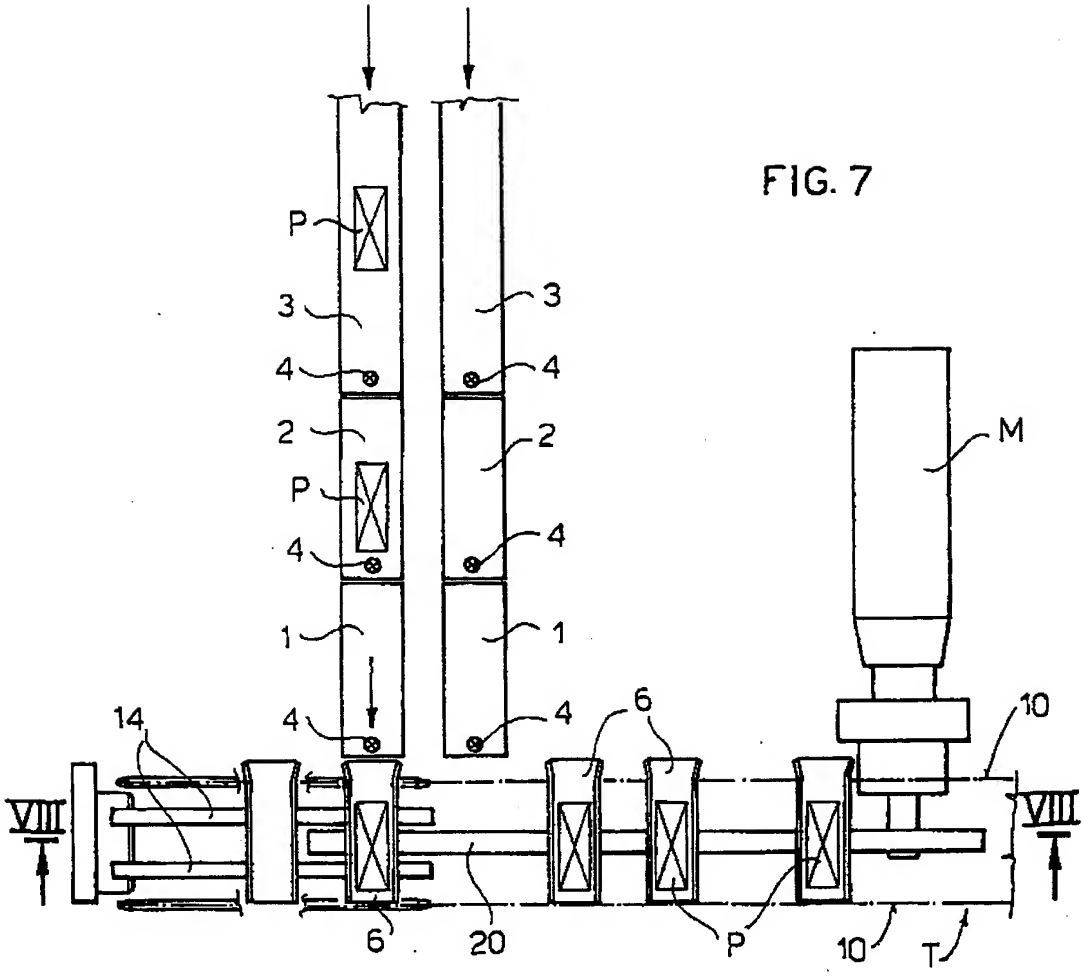
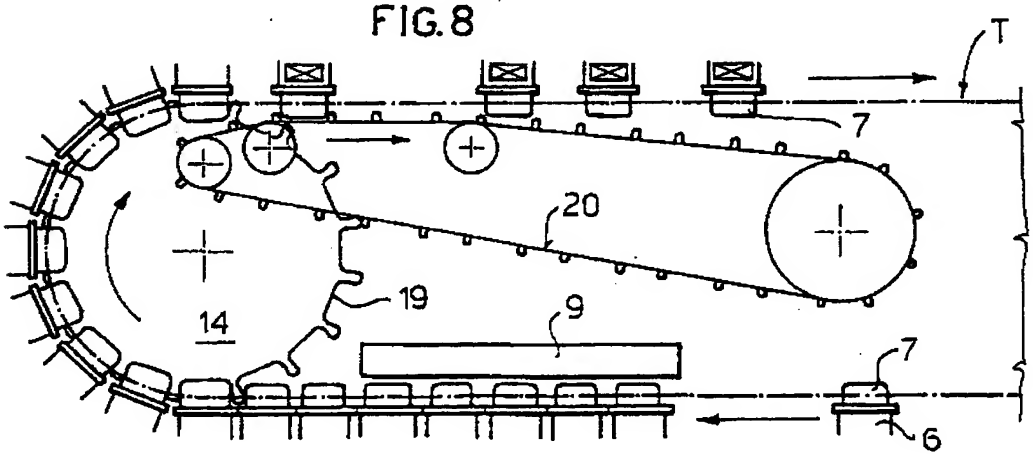


FIG. 8



European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 11 9225

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	EP-A-0 316 990 (VORTEX SYSTEMS) * the whole document *	1,10	B65G47/08 B65G17/00
A	EP-A-0 276 409 (FERAG) * the whole document *	1,10	
A	DE-A-3 223 332 (HASSLER) * the whole document *	1	
A	DE-A-3 629 372 (GSA GESELLSCHAFT FUR SONDERMASCHINEN UND AUTOMATIONSANLAGEN) * figures 1-7 *	1,6	
A	GB-A-1 411 940 (TRANSMATIC LIMITED) * the whole document *	1,6	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B65G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	07 APRIL 1992	OSTYN T.J.M.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P0401)